

CLAIM AMENDMENTS

1 1. (previously presented) A device for need-controlled
2 modulation of physiological and/or pathological neuronal rhythmic
3 activity, the device comprising
4 a control unit,
5 at least one means for detecting brain activity and
6 connected to the control unit, and
7 a stimulator for generating a periodic succession of
8 pulses to control the phase dynamic of the neuronal rhythmic
9 activity and a desynchronization pulse following the periodic
10 succession of pulses to desynchronize the neuronal rhythmic
11 activity, the periodic succession of pulses and the
12 desynchronization pulse being visual or acoustic or tactile.

1 2. (previously presented) The device according to claim
2 1 wherein the stimulator is at least one component from the group
3 comprising a display screen, a pair of shutter-equipped eyeglasses,
4 a loud speaker, headphones, a pressure generator and a time-
5 modulated laser.

1 3. (previously presented) The device according to claim
2 1 wherein the means for detecting brain activity is at least one
3 component from the group comprised of a scalp EEG electrode or a
4 MEG electrode.

1 4. (previously presented) The device according to claim
2 1 wherein the means for detecting brain activity is connected with
3 the control unit via an isolating amplifier.

4 5. (previously presented) The device according to claim
5 1, further comprising
6 means connected to the control unit for feeding back a
7 patient reaction.

1 6. (previously presented) The device according to claim
2 1, further comprising
3 means for evoking physiological and/or pathological brain
4 activity.

1 7. (previously presented) The device according to claim
2 6, further comprising
3 means for carrying out a frequency scan.

1 8. (previously presented) The device according to claim
2 1, further comprising
3 means for quantifying the neuronal activity.

1 9. (previously presented) The device according to claim
2 8 wherein the means for quantifying the neuronal activity is a
3 means for quantifying the amplitude of the power spectrum over the
4 excitation frequency range or a means for quantifying the
5 instantaneous amplitude of the frequency range as determined by the
6 Hilbert transformation.

1 10. (previously presented) The device according to
2 claim 1 wherein the control unit is connected with means for
3 actuating the stimulator.

1 11. (previously presented) The device according to
2 claim 1, further comprising
3 means for investigating the signals measured by the
4 sensor.

1 12. (previously presented) The device according to
2 claim 11 wherein the means for investigating the signals measured
3 by the sensor carries out a Fourier transformation or a wavelet
4 analysis.

1 13. (previously presented) The device according to
2 claim 11, further comprising
3 means for registering the change in the amplitude of the
4 rhythm to be excited.

5 14. (previously presented))] The device according to
6 claim 1, further comprising
7 means for carrying out an entrainment.

1 15. (previously presented) The device according to
2 claim 1, further comprising
3 means for desynchronization.

1 16. (previously presented) The device according to
2 claim 14, further comprising
3 means for testing the quality of the entrainment.

1 17. (previously presented) The device according to
2 claim 16 wherein the means for testing the quality of the
3 entrainment comprises means for determining the phase or the phase
4 and the amplitude of the neuronal rhythm to be desynchronized.

5 18. (previously presented) The device according to
6 claim 17 wherein the means for determining the phase and amplitude
7 of the neuronal rhythm to be desynchronized carries out a Hilbert
8 transformation or a matching of the signals of the neuronal rhythm
9 with a slowly changing sine function in a sliding time window.

1 19. (previously presented) The device according to
2 claim 1, further comprising
3 means for evaluating the phase and amplitude of the
4 neuronal activity.

1 20. (previously presented) The device according to
2 claim 19 wherein the means for evaluating the phase and amplitude
3 of the neuronal rhythm contains means for calculating phase
4 resetting curves.

1 21. (previously presented) The device according to
2 claim 20, further comprising
3 means for visualization of the phase resetting curves.

1 22. (previously presented) The device according to
2 claim 20, further comprising
3 means for the quantitative characterization of the phase
4 resetting curves.

1 23. (previously presented) The device according to
2 claim 19, wherein the means for determining the amplitude is a
3 means by which the amplitude resetting curves are effected.

1 24. (previously presented) The device according to
2 claim 1, further comprising
3 means for determining the vulnerable phase of the
4 neuronal rhythm.

1 25. (previously presented) The device according to
2 claim 24 wherein the means for determining the vulnerable phase is
3 a means for varying the time spacing between the last excitation of
4 the entrainment and the desynchronizing excitation signal.

1 26. (previously presented) The device according to
2 claim 25 wherein the means for varying the time spacing between the
3 last excitation of the entrainment and the desynchronizing is a
4 means which effects a variation in the time spacing for different
5 values of the intensity.

1 27. (previously presented) The device according to
2 claim 25 wherein the means for varying the intensity is a means for
3 increasing the intensity in equidistant steps.

1 28. (previously presented) The device according to
2 claim 24, further comprising
3 means which enables from a series of test stimulations
4 optimal stimulation parameters to be determined.

1 29. (previously presented) The device according to
2 claim 28, further comprising

3 means which detects stimulation parameters from a series
4 of test stimulations from which a minimization of the amplitude of
5 the neuronal activity to be desynchronized can be obtained.

1 30. (previously presented) The device according to
2 claim 29 wherein the means for determining the minimization of the
3 amplitude of the stimulation parameters which give rise to a
4 desynchronization of the rhythm comprises a means for carrying out
5 the Hilbert transformation.

1 31. (previously presented) The device according to
2 claim 29 wherein the means for determining the minimization of the
3 amplitude of the stimulation parameters giving rise to a
4 desynchronization of the rhythm comprises a means for matching a
5 slowly changing sine function to a signal of the sensor in a time
6 window following stimulation.

1 32. (previously presented) The device according to
2 claim 29 wherein the means for determining the stimulation
3 parameters giving rise to a minimization of the amplitude of the
4 desynchronizing rhythm comprises a means for integrating the
5 amplitude of the power spectrum over the frequency band of signals
6 measured by the sensor in a time window following the stimulation.

7 33. (previously presented) The device according to
8 claim 20, further comprising
9 means for increasing the intensity in non-equidistant
10 steps.

11 34. (previously presented) The device according to
12 claim 20, further comprising
13 means for evaluating phase resetting curves with which
14 the effect of the desynchronizing excitation pulse on the phase
15 dynamics of the desynchronizing neuronal activity is investigated.

1 35. (previously presented) The device according to
2 claim 34 wherein the means for evaluating the phase resetting
3 curves comprises a means for applying ϕ_e , the phase of the neuronal
4 activity before stimulation, over ϕ_b , the phase of the neuronal
5 activity after stimulation.

1 36. (previously presented) The device according to
2 claim 34 wherein the means for evaluating the phase resetting
3 curves comprises a means for determining the position of the phase
4 resetting curve at which the transition from a main rise 1 to a
5 main rise 0.

1 37. (previously presented) The device according to
2 claim 1, further comprising
3 means for monitoring the stimulation.

4 38. (previously presented) The device according to
5 claim 1 wherein the desynchronization pulse follows the periodic
6 succession of pulses with a predetermined time delay.

1 39. (new) A device for need-controlled
2 resynchronization of pathologically rhythmic brain activity of a
3 patient, the device comprising:

4 a stimulator for generating visual, acoustic, or tactile
5 pulses and applying them to the patient,

6 at least one sensor means for detecting brain activity of
7 the patient, and

8 control means connected to the stimulator and sensor
9 means for:

10 in a first mode applying the pulses with the
11 stimulator to the patient with a pulse
12 frequency varying across a broad range while
13 monitoring with the sensor means brain activity
14 of the patient until a narrow frequency range
15 within the broad range is determined that
16 excites brain activity in the patient, and
17 in a second mode generating with the stimulator a
18 series of the pulses within the narrow
19 frequency range followed after an interval by a
20 single pulse and varying the length of the
21 interval while monitoring with the sensor means

22 brain activity of the patient to determine an
23 interval at which the strongest
24 desynchronization of pathologically rhythmic
25 brain waves of the patient is effected.

26 40. (new) The device according to claim 39 wherein in
27 the second mode the control means also varies an intensity of the
28 single pulses while monitoring with the sensor means brain activity
29 of the patient to determine an intensity at which the strongest
30 desynchronization of pathologically rhythmic brain waves is
31 effected.

32 41. (new) The device according to claim 40, wherein in
33 a third mode the control means controls the stimulator such that
34 the stimulator generates a succession of pulses having a frequency
35 within the narrow frequency range and a single pulse of the
36 determined intensity and following the periodic succession of
37 pulses by the determined interval to desynchronize the
38 pathologically rhythmic brain activity.